

Prognosis of Pregnancy and Childbirth in Heart Operated Patients: Experience in a 3 Referral Hospital in Mali, Case of the Gabriel University Hospital in Bamako

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Abstract

Introduction: In sub-Saharan Africa and Mali, young women who have had heart surgery want to become pregnant. The occurrence of pregnancy in these women who have had heart surgery is becoming more and more frequent in our country because of the persistence of acute rheumatoid arthritis (RAA) and especially the increasingly easy access to heart surgery. **General Objective:** To study the evolution of pregnancy and the prognosis of childbirth in women who have undergone heart surgery. **Methodology:** This was a retrospective and descriptive study that took place over a period of five (5) years in the gynecology-obstetrics department of University Teaching Hospital (UTH) Gabriel Touré and the cardiology department of UTH Luxembourg. Was included in the study any pregnant woman admitted to the gynecology-obstetrics department of UTH Gabriel Touré and having a history of heart surgery. The variables studied were the socio-demographic characteristics, the type of heart disease, the management, the evolution of the pregnancy and the prognosis. Data was typed on word processor, Excel and analyzed on Epi info and SPSS. The Chi square or Fisher exact test (for the number < to 5) and the relative risk (RR) with confidence interval (CI) to 95% were calculated. P was considered as significant if <0.05. **Results:** Of the 13,388 pregnant women admitted to the gynecology/obstetrics department of UTH Gabriel Touré, 20 pregnant women had a history of heart surgery (1.49‰). The average age was 26 years old. The main cardiac pathology was valvular heart disease supported in 80.00% by the placement of a prosthesis.

During pregnancy follow-up, 55% of pregnant women were on Anti-Vitamin K (AVK). In 95.00% of cases, heart disease was asymptomatic. We reported a case (5.00%) of iterative cardiac decompensation, in which cardiac ultrasound found a very arrhythmic heart, grade III mitral leak, and massive aortic leak. We did not find any case of prosthetic thrombosis. The abortion rate was 5.00%. The caesarean section rate was 31.60% and the instrumental extraction rate (forceps) was 23.10%. Newborns had a normal birth weight (68.40%), and were hypotrophic (15.80%) and premature (15.80%). In pregnant women on AVK, we reported 2 cases of fetal deaths in utero (10.00%). **Conclusion:** Surgical treatment of operable heart disease is a real prophylaxis for gravidocardiac accidents. Pregnancy can be well tolerated in patients who underwent heart surgery with artificial heart valves.

Keywords

Cardiac Surgery, Pregnancy, Prognosis

1. Introduction

The association cardiopathy and pregnancy are common and some of these heart diseases require surgery (congenital malformations, severe rheumatoid arthritis). The management of heart disease during pregnancy poses two different problems, namely the evaluation and monitoring of pre-pregnancy cardiopathies which can be decompensated by the physiological changes induced by the latter and the peripartum [1]. The maternal morbidity associated with congestive heart failure, arrhythmia and vascular accidents is estimated between 8.00 and 30.00% and the fetal morbidity with increased prematurity and intrauterine growth retardation is estimated to 20.00% of pregnancies [1]. In Western industrialized countries, 0.20% to 4.00% of pregnancies are complicated by cardiovascular diseases, so in the United Kingdom, cardiovascular diseases are the leading cause of maternal deaths (2.31 per 100,000 pregnancies) and keep on increasing [2].

The management of these patients is based on a good knowledge of the physiological changes induced by pregnancy, as well as on a multidisciplinary approach as early as possible associating the cardiologist, the anesthesiologist, the resuscitator and the obstetrician gynecologist. In sub-Saharan Africa and Mali, rheumatoid arthritis is a common nosological group of cardiovascular pathologies [3]. Its treatment often requires the use of heart surgery often in women of childbearing age.

Indeed, the hemodynamic changes in pregnancy can unbalance in these pregnant women more or less precarious cardiac function [4]. In addition, the anti-coagulant treatment to which patients with heart valves are subjected raises delicate therapeutic problems such as the risk of thromboembolism for the mother, the teratogenic risk for the fetus, and the risk of hemorrhage for the Moth-

er-Fetus couple [4] [5]. Although the most complex situations are only documented by cases or series analyzed retrospectively or with observation, we have initiated this study to evaluate the evolution of the pregnancy in the heart operated pregnant women and establish the maternal-fetal prognosis.

2. Materials and Method

This was a retrospective and descriptive study that took place over a period of five (5) years from January 1st, 2005 to December 31st, 2009, in the gynecology-obstetrics department of Gabriel Touré University Teaching Hospital (UTH) and cardiology department of UTH Luxembourg. Was included in the study any pregnant woman admitted to the gynecology-obstetrics department of UTH Gabriel Touré and having a history of cardiac surgery. Not included in our study were all pregnant women who had no history of cardiac surgery or who had a history of cardiac surgery but who gave birth elsewhere or who refused to participate in the study or patient records were unusable.

The variables studied were the socio-demographic characteristics, the type of heart disease, the management, the evolution of the pregnancy; the maternal-fetal prognosis.

The collection materials were: operative reports of cardiac surgery, prenatal check-books, birth records. The data was entered on Word, Excel and analyzed on epi info and SPSS. The Chi 2 test or Fisher's exact test (for numbers < to 5) and the relative risk (RR) with its confidence interval to 95% were calculated; p was considered significant if <0.05. Within the ethical framework, this present work has a purely scientific aim and intends to contribute to the fight against maternal-fetal morbidity and mortality which remain a real public health problem in developing countries, and more particularly in Black Africa. It guarantees the confidentiality of the data collected. The patients were informed of this confidentiality and freely consented to participate in the study.

3. Results

3.1. Frequency

We collected a total of 20 pregnant women who underwent heart surgery during the study period, with a prevalence of 0.14% (20/14285). There was an exponential evolution of the number of pregnant patients operated from the heart from 2 cases per year in 2005 to 7 cases in 2009.

3.2. Socio-Demographic Data: (see Table 1)

The average age of our pregnant women was 26 years with extremes of 17 years and 35 years. The 20 - 30 age group was the most represented with 85.00%. All of our pregnant women were married, or 100%. The primigravida represented 60.00%, with 2 pregnancies of the extremes of one and 4 pregnancies. Nulliparous were in the majority (60.00%) followed by primiparous (20.00%) and pauciparous (20.00%).

Table 1. Socio-demographic characteristics.

Parameter	Number	Percentage
Age		
20 - 30 years	17	85.00%
17 - 19 years	03	15.00%
Gravidity		
Primigravida	12	60.00%
Paucigravidy	08	40.00%
Parity		
Nulliparous	12	60.00%
Pauciparous	08	40.00%

3.3. Clinical Aspect: (See Table 2)

Patients underwent cardiac surgery at the age group of 11 to 19 years in 70% and at age 30 and over in 5.00%. Mitral heart valve diseases were the type of cardiopathy the most predominant (65.00%) followed by Myxoma (10.00%). The impairment was mono valvular (87.50%) and poly valvular in 12.50%.

The mitral prosthesis was the type of surgery performed (80.00%) followed by the aortic prosthesis, patch CIV closure, atrial myxoma resection and CIA closure (5.00%) each. The patients were on AVK in 65.00% before the beginning of pregnancy and in 55.00% during pregnancy. Other anticoagulants during pregnancy were heparin in 5.00% and 40.00% of the pregnant women were not on anticoagulant.

3.4. Management and Prognosis during Pregnancy: (See Table 3)

Throughout the pregnancy, 55.00% of our pregnant patients were on AVK and that since the first trimester and 40.00% were not on anti-coagulant. Our pregnant women did antenatal visits to a midwife in 70.00% versus 30.00% who were seen by obstetricians. Regarding the evolution of pregnancy, 5% of pregnancies were complicated by spontaneous abortion and 5.00% by fetal malformations. We did not notice any maternal complications in 85.00% of our pregnant patients, however, we recorded one case of cardiac decompensation (5.00%).

3.5. Management and Prognosis of Delivery: (See Table 4)

At the time of delivery, 42.1% of our pregnant patients were on AVK compared with 10.50% who were on heparin. Our patients delivered by caesarean section in 31.60% versus 68.40% by vaginal route including 3 cases of instrumental extractions. The indications for caesarean section were respectively Acute Fetal Distress (AFD) (33.30%), BGR (16.60%), heart failure (16.60%) and operated heart (33.30%). Immediate postpartum care was simple in 84.20% of our patients. Three patients (15.80%) experienced impaired cardiac function, including an iterative cardiac decompensation with mitral insufficiency associated with

Table 2. Clinical characteristics.

Characteristics	Number	Percentage
Age at surgery		
11 - 19 years	14	70.00%
≥30 years	06	30.00%
Type of cardiopathy		
Mitral deficiency	10	50.00%
Mitral closure	08	40.00%
Myxoma	02	10.00%
Type of heart valve disease		
Monovalvular	14	70.00%
Polyvalvular	06	30.00%
Type of surgery		
Mitral prosthesis	16	80.00%
Aortic prosthesis	04	20.00%
AVK before pregnancy		
Yes	13	65.00%
No	07	35.00%

Table 3. Management and prognostic during pregnancy.

Elements	Number	Percentage
Anticoagulant treatment		
AVK	11	55.00%
Heparin	02	10.00%
Without anticoagulant	7	35.00%
ANC provider		
Obstetrician	06	30.00%
Midwife	14	70.00%
Pregnancy evolution		
Spontaneous miscarriage	04	20.00%
Normal	16	80.00%
Maternal complications		
None	17	85.00%
Bad functioning tolerance	03	15.00%

ANC: pregnancy monitoring

massive aortic insufficiency.

Regarding neonatal prognosis, we recorded 15.80% premature and 15.80% fetal hypotrophy.

Table 4. Prognostic of delivery.

Parameters	Number	Percentage
Anticoagulant treatment during delivery		
AVK	08	42.10%
Heparin	02	10.50%
Without anticoagulant	9	45.00%
Delivery mode		
Caesarian	06	30.00%
Instrumental extraction	04	20.00%
Spontaneous	10	50.00%
4 Indications of caesarian		
AFD	02	33.30%
Cardiac insufficiency	02	33.30%
BGR	01	16.60%
Heart operated	01	16.60%
Postpartum care		
Simples	16	80.00%
Impaired cardiac functioning	04	20.00%
Fetal prognostic		
Stillbirths	02	10.00%
Hypotropia	03	15.00%
Preterms	03	15.00%
Fetal malformations	01	05.00%
Normal birth	11	55.00%

AFD: Fetal asphyxia dystocia; BGR: Basin generally narrowed; AVK: Anti-vitamin K.

4. Discussion

4.1. Methodological Approach

This was a retrospective and descriptive study that took place over a period of five (5) years from January 1st, 2005 to December 31st, 2009 in two hospitals of Bamako district.

The difficulties during our study were essentially:

- the absence of the operative report of the cardiac surgery in the obstetrical file of the patients,
- the absence of direct contact of most patients,
- the absence of the cardiological management protocol in the obstetrical file.

4.2. Frequency

We collected a total of 20 pregnant women who underwent heart surgery during the study period with a prevalence of 0.14%. M'baye and col. [5] had found a

prevalence of 0.12% at DAKAR UTH in a series of 14 cases. ABDELLAOUI Y [6] in Fes and Assia AI [7] in Marrakech in Morocco reported a frequency of 1.20% and 3.20% respectively. Benzerdjeb B. [8] in Algeria reported a frequency of 0.19% in her series. The low prevalence in our series is explained by the difficulty of access to cardiac surgery in our country. In developed countries, heart valve diseases are becoming rarer in young women and the etiologies currently observed are predominantly degenerative and involve an older population [4]. In the literature, the association heart and pregnancy is about 1.00% [4] [9].

4.3. Socio-Demographic Characteristics

The age of the patient is largely involved in the assessment of maternal risk. The average age of our patients was 26 years, with extremes of 17 years and 35 years. This average is parallel to the data of the literature. Hanania *et al.* [10] in France and Iturbe-Alessio *et al.* [11] in Egypt reported an average age of 26 years and 27.7 years, respectively.

Assia Ai [7] and Abdellaoui Y [6] in Morocco reported respectively an average age of 30.24 years with extremes of 18 years and 41 years and 31 years with extremes of 22 years and 40 years. Benzerdjeb B. [8] in Algeria reported an average age of 32 years with extremes of 18 years and 44 years.

Multiparity may be the cause of some important obstetric complications such as Placenta Praevia (PP), Placental Hematoma (PH). The average gravidity of our pregnant women was 2 gravida and the average parity of 0.6 parous. M'baye and col. [5] had found a mean gravidity of 2.3 gravida with extremes of one and 12 for gravidity and an average parity of 0.60 parous. Abdellaoui Y [6], Assia Ai [7] in Morocco and Benzerdjeb B. [8] in Algeria reported respectively 26.90%; 40.74% and 27.00% of primiparous.

4.4. Clinical Aspect

Heart diseases requiring surgical intervention should, in principle, have been made before pregnancy. However, surgery may be necessary during pregnancy if complications occur. The best time for correction of heart disease remains before pregnancy to avoid any fetal or maternal complications apart from the risks associated with surgery. All our patients were operated on before pregnancy.

The mean age at the time of cardiac surgery was 18.50 years with extremes of 11 years and 32 years. M'baye and col. [5] found an average age of 21.60 years in patients in their series at the time of valve replacement.

In our study, cardiac surgery was performed in 80.00% of the cases by a heart valve disease, in 10% of the cases by a myxoma of the atrium, in 5.00% of the cases respectively by an inter ventricular communication and an inter auricular communication. Mitral disease is generally well tolerated with possible occurrence of congestive heart failure. Mitral heart valve diseases were the most dominant in our study. They were isolated in 65.00% of cases, and associated in 15.00% of cases with an attack of other valves. Despite its high frequency in all

series, the polyvalvular endocarditis represented 12.50% in our series to 42.32% in the study of Abdellaoui Y [6]. The mitral prosthesis was the type of surgery performed (80.00%) followed by the aortic prosthesis, patch CIV closure, atrial myxoma resection and CIA closure (5.00%) each. The progression of medical management by the broad application of antibiotic prophylaxis to acute rheumatic fever (ARF) and the progress of screening and early surgical treatment of congenital heart disease has made it possible to change the pattern of women with heart disease observed during pregnancy in Western countries with regression of heart valve disease of 20.00% in the UK or even 10.80% in Germany compared to congenital heart disease [12]. Abdellaoui Y [6] in Fez, in his series, reports a 30.7% history of cardiac surgery before pregnancy dominated by mitral and aortic prosthesis and the types of heart disease were heart valve diseases (92.32%), including RM (53.86%), IM (34.62%) and congenital heart disease (3.84%). Benzerdjeb B. [8] reported in her series 13 pregnant women operated from the heart over 22 cases of cardiopathies and pregnancy, or 59%. The cardiac pathologies were dominated by heart valve diseases 61.0% (IM, RM, RA) congenital heart disease in 17.0% (CIA, CIV). These were essentially prosthetic surgeries [8]. Assia Ai [7] in Marrakech reported in her study 22.22% history of cardiac surgery (18/81 patients) dominated by the mitral prosthesis (11.11%) and the mechanical valve (9.87%). M'baye and col. [5] reported that the mitral prosthesis was the dominant surgery (85%).

4.5. Management and Prognosis during Pregnancy

A normal pregnancy imposes a regular obstetric follow-up schedule. However, a pregnant cardiac woman requires more rigorous follow-up and multidisciplinary care, including experienced cardiologists who must team up with obstetricians, anesthesiologists and neonatologists, with the aim of informing the patient of the maternal and fetal risks of pregnancy and establishing a clinical and cardiographic examination with an adaptation of the medical treatment and rarely asking the surgical indication. Patients had antenatal visits to a midwife in 70.00% versus 30.00% who were seen by obstetricians. A poor frequency compared with the risk incurred in parturient women with heart disease. This may be due to either difficulties of access to care, economic problems or failure to raise the patient's awareness of the risks. Assia Ai [7] and Abdellaoui Y [6] reported in their studies that patients were not followed in respectively 30.86% and 42.30%. The treatment of a cardiopathy in a pregnant woman is a challenge sometimes difficult. An evaluation is necessary for the expected benefit and the potential risk for the child. No therapeutic substance prescribed during pregnancy can be considered totally harmless. During the whole pregnancy, 55.00% of our pregnant women were on AVK and that since the 1st trimester and 40.00% were not under anti-coagulant. In contrast, 45.67% of the pregnant women were on anticoagulant and 12.34% on digitalis in the study of Assia Ai [7]. In the study of Abdella Y [6] 23.07% were on anticoagulant. Pregnancy is responsible for a state

of hypercoagulability that increases the risk of thrombosis. So, the problem is not so much the haemorrhagic risk as the thromboembolic risk. The risk of maternal and fetal hemorrhage exists throughout pregnancy, but also during delivery and postpartum. At the obstetric level, standard care had been taken, with an average of one antenatal consultation per month. Most patients were received during the 2nd trimester of pregnancy and did not benefit from a relay of AVK treatment by heparinotherapy during the first quarter period. Only 5.00% of our pregnant women had benefited from a relay of AVK treatment by subcutaneous route during the first trimester period. 10.50% of our pregnant women had benefited from AVK treatment with heparin, reintroduced during the last two weeks of pregnancy. This heparinotherapy was discontinued at the beginning of labor and resumed six to ten hours after delivery. Low molecular weight heparins were the most used. Thus, Enoxaparin (Lovenox) was used at a dosage of 4000 IU every 12 hours. This protocol contrasts with the literature [13] which advises a relay of AVK by heparin two weeks before the expected date of delivery. Our results could be explained by the fact that 60% of our pregnant women were attended by midwives in antenatal care. In our study, only one pregnant woman, 5% of the series had metrorrhagia, without hemodynamic consequences in the 1st trimester. The pregnant woman was on heparin. Iturbe-Alessio *et al.* [11] found 13.20% hemorrhage under heparin, while M'baye *et al.* [5] found 42.80% in their series.

Spontaneous abortions are more common with anticoagulants. In our series we pointed out 5.00% of cases of spontaneous abortions. Thomas D. *et al.* [14] and Assia Ai [7] reported respectively 19.00% and 3.70% spontaneous abortions in their series, compared to 10.00% in the general population. Our result is lower than this result. This may be explained by the small size of our sample but also by the fact that all our patients were not under anticoagulant.

Maternal risks depend on the nature of the cardiopathy and its pre-conception functional tolerance, which may range from deteriorating ventricular function to heart failure or even death. Heart disease was most often asymptomatic during pregnancy; however, we noted three cases of dyspnea (15.00%) including one case (5.00%) of cardiac decompensation iterative in whom cardiac ultrasound had found a very arrhythmic heart, a grade III mitral leak, and a massive aortic leak requiring a proposal for double valvular substitution. M'baye and col. [5] found 21.40% heart failure. In their series, Hanania *et al.* [10], Salazar *et al.* [15] figured out respectively 2.20% and 2.00% heart failure. Abdellaoui Y [6] in his series reported 13 cases of complication (50.00%) of which 12 developed heart failure and 1 case of PAH. Assia Ai [7] pointed out in her study that 32 women, or 39.50% of parturients, had complications during pregnancy dominated by heart failure and cardiogenic shock.

In our study, we did not find any case of prosthetic thrombosis. In the literature, the percentage of prosthetic thrombosis varies between 0.00% and 9.20% [15] [16]. Our results could be explained by the use of little thrombogenic prosthesis, Saint-Jude type. Thromboembolic events, however, were high in other

studies such as that of Hanania *et al.* [10] where they were multiplied by ten. The risk of thromboembolism was 4.5 times higher with heparin than with AVK, as found in the Iturbe-Alessio *et al.* [11] where the three cases of prosthetic thrombosis all occurred with heparin.

4.6. Management and Prognosis of Childbirth

The question that always arises regarding cardiac parturients is the mode of delivery of the patients and the type of adequate anesthesia. Vaginal delivery remains the preferred delivery mode for most women with heart disease unless there are specific obstetric indications.

In our study, 31.60% of pregnant women gave birth by caesarean section and 68.4% delivered vaginally, of which 23.1% benefited from forceps assisted delivery. This result is lower than that reported by M'baye *et al.* [5] which was 77.70%. Assia Ai [7], Benzerdjeb B. [8] and Abdellaoui Y [6] reported respectively 51.8%; 35% and 72.73% vaginal delivery. None of our parturients has benefited from epidural anesthesia, however Abdellaoui Y [6] reports 12.5% in her series. Our caesarean section rate is similar to data from the literature [6] [7] [8] who reported 48.15%, 65.00% and 27.27% respectively.

The indications in 50.00% of women having caesarian section are strictly cardiac and compatible with the literature [6], while 50% of women who underwent caesarian section are for obstetric causes. We observed no complication at the time of delivery, the same observation was made by Benzerdjeb B. [8]

However, in the postpartum, the main complications for these women are mainly hemorrhagic and thromboembolic in parturients under anticoagulant and those with mechanical valves. Hemodynamic complications remain rare and can be prevented in some situations by surgical or interventional correction during pregnancy or per-partum. The risk of infection is low given the protocols of antibiotic prophylaxis.

In our study, one patient developed an iterative cardiac decompensation, in which cardiac ultrasound revealed a very arrhythmic heart, grade III Doppler mitral leak, massive aortic leak, and dilated left ventricle. This required a proposal for a double mitro-aortic valve replacement. Abdellaoui Y [6] did not find any postpartum complications in her series, however Assia Ai [7] reported that 30.8% of patients had post-partum complications dominated by cardiac decompensation (19.75%) and thromboembolic events (6.17%).

We did not notice any haemorrhage of the delivery, nor haemorrhage in the postpartum. Lee PK *et al.* [17] reported two cases of massive bleeding of the delivery. This result contrasts with ours and may be accounted for by the size of our sample which is lower than that of Lee PK *et al.* [17]. We did not also have maternal deaths in our series, however maternal mortality was 12.3% in the series of Assia Ai [7] with heart valve diseases (8.6%); peripartum cardiomyopathy (2.46%) and dilated cardiomyopathy (1.23%). Our results are parallel to those of Vitale [18] on a series of 58 pregnancies. Iturbe-Alessio *et al.* [11], Born *et al.* [19], Larrea *et al.* [20] found respectively 2.7%, 5.7%, and 2.1% of deaths. M'baye

and col. [5] found 7.1% of deaths in their series.

The fetal risks are related either to the existence of a maternal cyanosis leading to an insufficiency of oxygenation responsible for abortion, prematurity, IUGR, or a deterioration of the maternal cardiac function responsible for a circulatory insufficiency of the placenta. In our study, we recorded 19 newborns, including 3 cases of premature babies (15.80%); 3 cases of hypotrophy (15.80%). In our series, we noted two cases of fetal death in utero (10.00%) and their mothers were all under AVK throughout the pregnancy. Our prematurity rate is similar to that of Abdellaoui Y [6] (12.00%) and our fetal mortality rate is lower than that of Assia Ai [7] (23.5%). This difference can be explained by the size of our sample of 22 patients versus 81 patients for Assia Ai.

The only case of fetal malformation we had, was in a mother who was not on anticoagulation, but who was the oldest in the series. Coumarin embryopathies vary widely according to the literature, ranging from 0% to 44% [15]. Sareli *et al.* [21] and Iturbe-Alessio *et al.* [11] reported in their series 4% and 28.5% respectively. However, coumarin embryopathies have been reported in series where high doses of AVK have been used [5]. Most of our patients were under minisintrom dosed at 1 mg. It has been shown that when the dosage of warfarin is less than or equal to 5 mg/day, the incidence of coumarin embryopathy decreases significantly or even nil [18]. Our results are in agreement with those of Hania *et al.* [10].

5. Conclusions

At the end of our five-year retrospective study, we found out that in Mali, cardiac surgery is mostly performed during adolescence and that cardiac surgery is largely dominated by heart valve diseases.

Despite the lack of pre-conception management, pregnancy can be well tolerated in patients with heart operated surgery and artificial valves.

The management of these parturients must be multidisciplinary, in collaboration between cardiologist, obstetrician, resuscitator and neonatologist; based on a good understanding of the risks specific to each pathology.

The planning of pregnancy and a maximum avoidance of acute decompensations, would improve the maternal-fetal prognosis.

The surgical treatment of operable cardiopathies is a real prophylaxis for gravidocardiac accidents.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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